

WHAT IS CLAIMED IS:

1. A vertical MOS transistor comprising:
  - a semiconductor substrate of a first conductivity type;
  - an epitaxial growth layer of the first conductivity type which is formed on the semiconductor substrate;
  - a body region of a second conductivity type which is formed on the epitaxial growth layer;
  - a heavily doped body contact region of the second conductivity type which is formed on a part of a surface of the second conductivity type body region;
  - a heavily doped source region of the first conductivity type which is formed on a part of the surface of the second conductivity type body region that is not covered with the heavily doped body contact region;
  - a silicon trench piercing the second conductivity type body region and the first conductivity type source region to reach an inner part of the first conductivity type epitaxial growth layer;
  - a gate insulating film formed along walls and bottom of the silicon trench;
  - a heavily doped polycrystalline silicon gate buried in the silicon trench to a level of the first conductivity type source region while surrounded by the gate insulating film;
  - an intermediate insulating film formed on the polycrystalline silicon gate in the silicon trench to reach a surface of the

semiconductor substrate;

a metallic source electrode having a flat surface to be in contact with the intermediate insulating film, the heavily doped source region, and the heavily doped body contact region; and

a metallic drain electrode connected to a rear surface of the semiconductor substrate.

2. A vertical MOS transistor according to claim 1, wherein an insulator is provided on the side walls of the silicon trench above the heavily doped polycrystalline silicon gate.

3. A vertical MOS transistor according to claim 2, wherein the insulator provided on the side walls of the silicon trench is a silicon nitride film.

4. A vertical MOS transistor according to claim 3, wherein the heavily doped polycrystalline silicon gate buried in the silicon trench is 0.5  $\mu\text{m}$  to 1.0  $\mu\text{m}$  down from the top of the trench.

5. A vertical MOS transistor according to claim 2, wherein the heavily doped polycrystalline silicon gate buried in the silicon trench is 0.5  $\mu\text{m}$  to 1.0  $\mu\text{m}$  down from the top of the trench.

6. A vertical MOS transistor according to claim 1, wherein the heavily doped polycrystalline silicon gate buried in the silicon trench is 0.5  $\mu\text{m}$  to 1.0  $\mu\text{m}$  down from the top of the trench.